# CHAPTER 9. FLOOR FINISHES

## Section 1. GENERAL

9.1.1 SCOPE. This chapter covers the types of finishes used and the painting operations necessary to adequately finish and protect interior and exterior floors, decks and walkways. The surfaces to be painted include wood, concrete and metal. Special coatings for use on floors, e.g., nonslip coatings, are also included in this chapter. Marking for floor safety is covered in Chapter 11.

9.1.2 PURPOSE OF FLOOR FINISHING. Floors are finished primarily to protect the substrate, which, if left unprotected, would deteriorate. Since floors are subject to constant wear, they require the use of high quality, wear-resistant finishes. Interior floors are finished to promote cleanliness, since sealed and smooth floors are much easier to maintain. Nonslip floor finishes are used to provide safety in areas where smooth floors may create a hazard. To keep maintenance costs at a minimum, floor finishing for appearance only should be avoided.

9.1.3 CHOICE OF FINISHES. Floor finishes are either clear or pigmented. Generally, clear finishes are used only on interior wood floors, where the appearance of the natural grain is desired. Exterior floors and floors of concrete and metal should be finished with pigmented rather than clear finishes to assure better durability. The type of clear or pigmented finish to be used depends on the type of surface, the severity of service with special emphasis on anticipated wear, and on the retention of appearance, i.e., gloss and color retention required.

9.1.3.1 Type of Finish. Floor finishes vary in the following characteristics:

a. Clear Finishes: Transparent coatings are used to protect interior wood floors from wear without obscuring the natural appearance of the wood.

b. Pigmented Finishes: Floor finishes are pigmented to provide opacity and color. In exterior applications, pigmented finishes are much more durable than clear finishes. This is especially important on floors which are also subject to wear and on which water can collect and remain for a period of time.

c. Gloss: Floor finishes are either semigloss or high gloss for optimum ease of maintenance and resistance to wear. Flat finishes should be avoided since the high percentage of pigment used (see 6.3.4.1 and Figure 6-1) makes these finishes too porous for use on floors.

d. Colors: Colors of floor finishes usually are relatively dark, e.g., gray, red, or brown, to help make dirt less visible. Safety marking colors are referenced in Chapter 11.

9.1.3.2 Type of Service. Most floor paints used are for normal service. Some are designed to withstand abnormal service, e.g., exposure to dampness, as in shower rooms, exposure to marine, and corrosive environments and to heavy traffic.

## Section 2. TYPES OF PRODUCTS AVAILABLE

9.2.1 GENERAL. A knowledge of the types of coatings and accessory products available is important in determining the capabilities and limitations of those which are recommended. There are sound reasons for the existence of each product specification and these become more apparent with some insight into the makeup of the finishes used. See Chapter 6 for a complete discussion on paint materials.

9.2.2 COATING PRODUCTS. 'The following types of coatings are used for finishing floors and walkways. Their relative properties are discussed in the sections in Chapter 6 referred to.

a. Alkyd: See 6.2.2.
b. Epoxy-Coal Tar: See 6.2.5.
c. Oleoresinous: See 6.2.10.
d. Phenolic: See 6.2.11.
e. Phenolic-alkyd: See 6.2.12.
f. Rubber-base: See 6.2.13.
g. Urethane: See 6.2.16.

These finishes are compared in Table 9-1.

9.2.3 ACCESSORY PRODUCTS. Accessory materials contribute to paint performance by preparing the surface before paint or varnish is applied. Their proper use will increase the life of the coating. This is especially important with floor finishes which are subjected to water, cleaning solutions and heavy traffic. Accessory products are discussed in detail in Chapter 4.

9.2.3.1 Surface Preparation. The following materials are used to prepare floors for finishing:

a. Solvent Cleaners: See 4.4.3.1.
b. Alkali Cleaners: See 4.4.3.2.
c. Acid Cleaners: See 4.4.3.4, 4.4.3.5.
d. Paint Removers: See 4.4.3.6.
e. Phosphate Treatments: See 4.4.4.1 and 4.4.4.2.
f. Wash Primers: See 4.4.4.3.
g. Knot Sealers: See 4.4.5.2.
h. Wood and Masonry fillers: See 4.4.5.3.

See also Chapter 4, Tables 4-4 and 4-5.

9.2.3.2 Surface Repair. The following products are used to repair defects, fill crevices and openings, and otherwise repair floors.

a. Putty: See 4.5.3.
b. Portland Cement Grout: See 4.5.6.4.
c. Plastic Wood: See 4.5.6.5.

9.2.4 APPLICABLE SPECIFICATION. The specification products recommended for use on floors and walkways are listed in their appropriate groups in Appendix D-4, Tables 17 through 19.

TABLE 9-1
Types of Floor Finishes

| | | Finish | | | |
|---|---|---|---|---|---|
| Type | Solvent | Clear | Paint | "Caution" | Notes |
| Alkyd | MS | O | X | Avoid use on alkaline, damp surfaces. | All purpose, for general use. |
| Alkyd phenolic | Arom | O | X | Avoid use on damp surfaces | Marine use, more resistant to water and abrasion. |
| Epoxy--coal tar | Lacq | 0 | X | Avoid exterior use; limited pot life. | Black, 2 component, excellent adhesion and corrosion resistance. |
| Oleoresinous | MS | X | 0 | Avoid use on damp surfaces. | Interior wood; fair abrasion resistance. |
| Phenolic | Arom | X | 0 | Surface preparation is critical | Darker color, fast dry, resistant to water, cleaners, alkali. |
| Rubber base | Arom | 0 | X | Avoid use on wood. | Very fast dry, resistant to water, cleaners, alkali. |
| Urethane (moisture-cured) | Lacq | X | X | Surface preparation is critical, very low humidity will retard dry. | Fast dry, excellent hardness, resistant to abrasion and chemicals. |

MS -- Mineral; Spirits
Arom -- Contains aromatic solvents
Lacq -- Lacquer type solvents
X -- Finish available
O -- Not available

9.2.4.1 General Purpose Coatings. The products most commonly used for painting floors are listed in Appendix D-1, Table 5.

9.2.4.2 Accessory Products. Materials used for surface preparation and repair are listed in the following tables in Appendix D-1:

a. Surface Preparation: See Table 1.
b. Surface Repair: See Table 2.

## Section 3. SURFACE PREPARATION AND REPAIR

9.3.1 GENERAL. One of the most essential parts of finishing floors is proper surface preparation and repair. Applied finishes will not adhere well, provide the required protection, nor have the desired appearance unless the surface is properly prepared. This is especially important on level floors where water and cleaners can remain for long periods of time, and where heavy traffic can subject the finish to excessive wear. Under these conditions, poor adhesion stemming from inadequate surface preparation can result in rapid paint failure.

9.3.2 TECHNIQUES. Methods of preparation and repair of floors and walkways are similar to those used on other exterior surfaces with one major difference. Since the surface is horizontal it lends itself to machine sanding very readily. Also, since large areas of the coating may be worn away by traffic, complete removal of the paint is more common.

9.3.2.1 Substrate. The techniques used in surface preparation depend on the substrate. The procedures specific to the type of substrate are as follows:

a. Wood: Prepare the surface by machine sanding to the extent possible. The major part of the floor is sanded by means of a large machine using a continuous band of abrasive paper and usually equipped with a vacuum attachment to remove dust. (See Figure 9-1.) The edges of the floor which cannot be reached by the large machine are sanded with a hand-held electric edger using abrasive paper discs. (See Figure 9-2.) The corners have to be scraped by hand. (See Figure 9-3.) Only experienced personnel should operate these machines inasmuch as inexpert operation can easily result in damage to the floor surface. First use No. 2 1/2-30 or No. 2-36 abrasive

paper to remove high Spots on new floors or to remove old finishes. Then smooth with No. 1-50 or No. 1/2-60 and finish with No. 1/0-80 or 2/0-100 abrasive paper. (See Table 7-2.) If the floor is made of pine or fir, omit the final finishing step since the resins in the wood will gum up the finer sand papers. Seal all knots and resinous areas with knot sealer and fill all cracks and crevices with either plastic wood or putty. Plastic wood matching the surrounding area must be used under clear finishes. Allow to dry hard, then sand smooth. When necessary, bleach wood with a solution of 6 ounces of oxalic acid in 2 quarts of hot water. Allow to dry thoroughly, then sand smooth.

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Note: Caution must be exercised when sanding or stripping floors to prevent an explosive dust or stripping vapor atmosphere.

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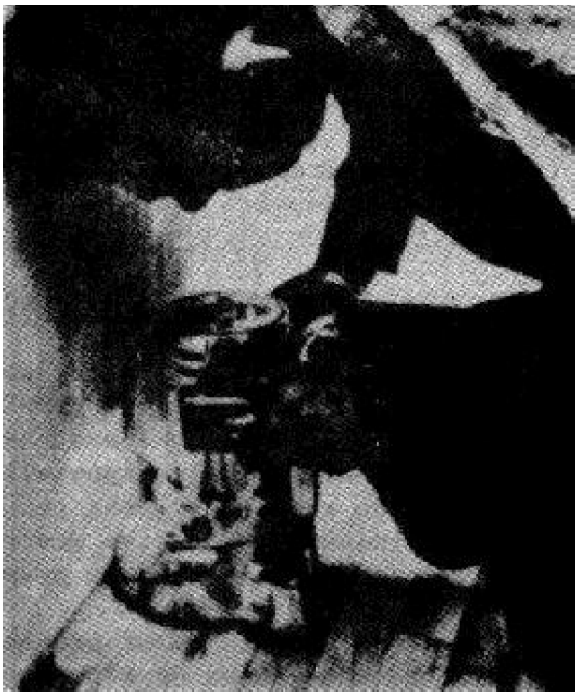

FIGURE 9-1
Belt Type Floor Sander

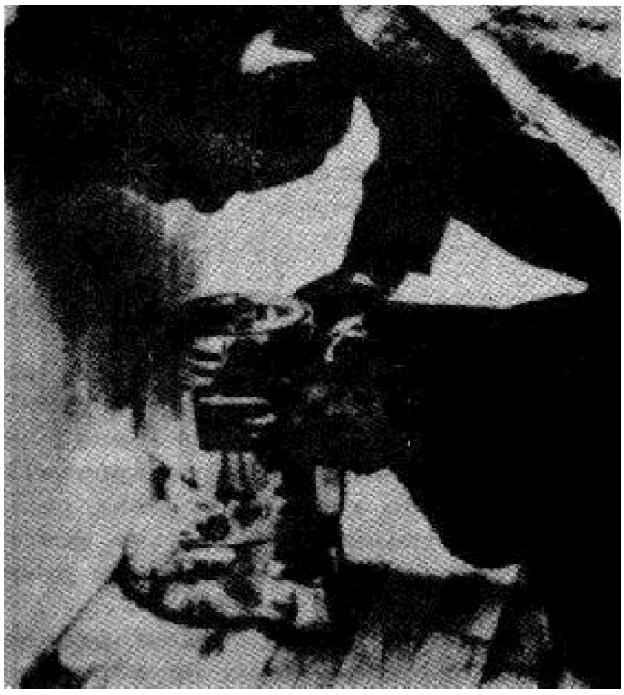

FIGURE 9-2
Disc Edger

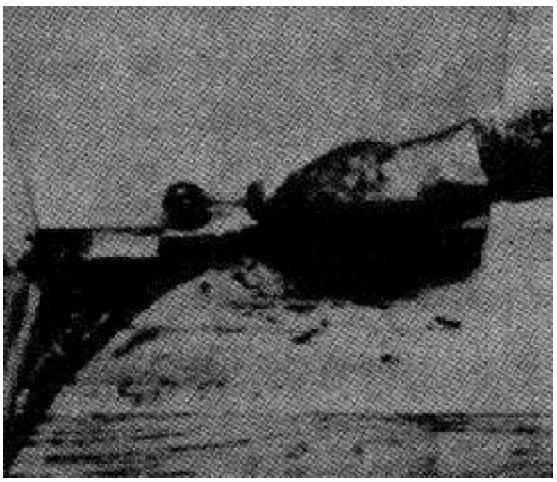

FIGURE 9-3
Scraping Corners

b. Concrete: Use same methods as in 7.3.2.2.

c. Metal: Use same methods as in 8.3.2.3 and 8.3.2.4.

9.3.2.2 Surface Preparation. The general methods used for surface preparation are discussed in Chapter 4, section 4. Refer to the following paragraphs for complete details.

a. Mechanical Cleaning, e.g., by hand and power tools, also flame and blast cleaning: Use same methods as in 8.3.2.6a.

b. Solvent, Chemical and Steam Cleaning: see 4.4.3.

c. Paint Removers: Use same method as in 7.3.2.6d.

d. Phosphate Treatments: See 4.4.4.2).

e. Wash Primers: Use same methods as in 7.3.2.6e.

f. Knot Sealers: Use same method as in 7.3.2.6f.

g. Wood Fillers: Use same method as in 7.3.2.[6]g.

9.3.2.3 Surface Repair. Surface repair of floors is similar to that required for other surfaces. Refer to the following paragraphs in Chapter 4, section 5:

a. Application of Putty: See 4.5.5.

b. Application of Plastic Wood: See 4.5.6.5.

c. Application of Portland Cement Grout: See 4.5.6.6.

## Section 4. SELECTION, PREPARATION AND APPLICATION OF COATINGS

9.4.1 SELECTION OF COATINGS. The choice of the coating system to be used depends on the following factors:

1. The substrate, e.g., wood, concrete, steel

2. Condition of substrate, e.g., rough, corroded, alkaline, painted

3. Limits in surface preparation, if any

4. Finish required, e.g., pigmented, clear, gloss, nonslip

5. Environmental conditions:

   (a) During painting operations, e.g., low humidity, temperature

   (b) During service life, e.g., rural, marine.

See Chapter 6, paragraph 9.2.2 and Table 9-1 of Chapter 9 for the comparative properties of the types of floor finishes available before selection of a coating system.* Coating systems recommended for floor finishing are listed in Appendix D-4 as follows:

Table 17: Recommended Coating Systems for Wood Floors

Table 18: Recommended Coating Systems for Concrete Floors

Table 19: Recommended Coating Systems for Metal Floors

9.4.1.1 Wood. Clear floor finishes are used on wood to preserve its natural appearance. Paints for wood should be relatively flexible to withstand the natural tendency for wood to expand and contract, especially across the grain, when there is any significant change in temperature. Wood will also absorb moisture if not protected on the back and edges. These problems are much less significant indoors, but must be considered when painting exterior wood decks. See 5.2.2.1 for potential problems with wood and Appendix D-4, Table 17 for recommended coating systems.

9.4.1.2 Concrete. Floors made of concrete tend to be alkaline, especially when new, and absorb moisture if situated below ground or directly on the ground as slabs on grade. Therefore, coatings for these surfaces should be

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*Note.~A complete numerical listing of the coatings described in this manual is given in Appendix D-3. These tables are designed primarily for the selection of coating systems for bare substrates. On previously painted floors, it is necessary only to prime areas where the substrate is exposed. If the untouched area is in good condition, apply two topcoats only in the worn area and one coat elsewhere. If clear finished floors are badly worn, remove the entire coating and refinish completely.

alkali resistant and have low water sensitivity. See 5.2.2.3 for potential problems with concrete and Appendix D-4, Table 18, for recommended coating systems. Generally, concrete floors are not painted.

9.4.1.3 Metal. The metal most frequently used for walkways is steel. The major problem with steel is that it will corrode rapidly if left unpainted, especially when exposed outdoors or in humid or corrosive environments. Consequently, bare steel must always be painted with a special anticorrosive primer before the floor enamel is applied. The primer must be hard enough to withstand traffic almost as well as the top coat. See 5.2.2.2 for potential problems with metals and Appendix D-4, Table 19, for recommended coating systems.

9.4.2 PREPARATION OF COATINGS FOR USE. The preparation of floor paints prior to use is similar to that for interior and exterior paints (see 7.4.2). Be especially careful to continually mix nonslip paints, in which the grit tends to settle, so as to assure uniform distribution of the grit in the applied film. The grit may be supplied separately (usually about 2 pounds per gallon) or the paint may be ready-mixed. In either case, mix thoroughly before use and keep well mixed during use.

9.4.3 APPLICATION OF COATINGS. The application of floor finishes is similar to the procedures used for interior and exterior paints. Many paints can be applied with a paint roller (see 4.6.4) using an extension pole long enough to allow rolling without stooping. Clear finishes may be applied by using a soft pad, such as one made of lambswool, attached to a long handle. (See Figure 9-4.) When painting new wood or concrete, either use a sealer or thin the first coat with 1 pint of recommended solvent per gallon to improve penetration. Apply the additional coats without thinning. Exercise caution to prevent an explosive vapor atmosphere.

9.4.3.1 Nonslip Floor Paints. Two types of nonslip paints are used:

a. Premixed Paints: The paint either has the abrasive pigment already mixed in or the pigment is shipped separately and mixed just before use. It is applied by brush or roller in a similar manner to general floor paints except with more care to be sure that the abrasive pigment is thoroughly mixed and evenly distributed.

b. Broadcast Type: The abrasive is packaged separately but is not added to the paint before use. The paint itself is applied in the normal manner and then the abrasive is broadcast over the wet paint film.

While painting, be sure to cover the floor area in such a manner as to allow the grit broadcaster to reach all areas as the work progresses. The actual broadcasting should be done only by experienced personnel. Be sure that the abrasive is distributed evenly and at the proper rate.

FIGURE 9-4
Applying Clear Floor Finishes

9.4.3.2 Peeling. If peeling is a serious problem, determine whether the underside of the floor is exposed to moisture. If there is a crawl space, paint the underside of the floor with a moisture resistant coating. If any earth is exposed under the floor, cover it with bituminous saturated roofing felt or heavy plastic such as polyethylene. Be sure that all walls around such crawl spaces are well ventilated to allow moisture from the earth to dissipate. Install fans in the wall, if necessary, to remove the moisture more efficiently.